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Outcome of ultrasound guided closed drainage of acute suppurative thyroid abscess as a definitive treatment modality

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ABSTRACT

Background: Thyroid abscess are relatively uncommon conditions in otolaryngology-head and neck surgery because of thyroid glands anatomical and physiological protective barrier. When it occurs it results in significant morbidity with potential mortality. Traditionally, surgical incision and drainage with antibiotics has been the mainstay of treatment. Some reports have suggested that ultrasound guided closed drainage is a less invasive and effective alternative in selected cases. The aim of our study is to evaluate the efficacy of ultrasound guided percutaneous closed drainage in the management of thyroid abscess.

Methods: From January 2013 to December 2016, patients presenting with thyroid abscess to the department of otolaryngology at Adichunchanagiri hospital and who subsequently underwent ultrasound guided percutaneous closed drainage were included in the study.

Results: Five patients were recruited for the study. After the aspiration of pus under ultrasound guidance, all patients were symptomatically improved and no patients needed open surgical drainage afterwards. After treatment, all patients were cured of their disease completely without any complications and with reduced hospital stay. After discharge, no patient showed any signs of relapse on regular follow-up.

Conclusions: Ultrasound guided percutaneous closed drainage of thyroid abscess is an effective and safe procedure because of good clinical outcome, patient satisfaction and reduced hospital stay. It is an effective alternative to open incision and drainage of thyroid abscess.

Keywords: Thyroid abscess, Closed drainage, Ultrasound guided, Incision drainage

INTRODUCTION

Acute suppurative thyroiditis is a very rare condition and progression to abscess formation is even rarer because of the anatomical and physiological characteristics of the thyroid gland which protects it against infection.

The characteristics which protects include its fibrous capsule, high glandular content of iodine which can be bactericidal, rich blood supply, lymphatic drainage, and separation of the gland from other cervical structures by fascial planes in the neck. Thyroid abscesses are uncommon in modern practice because of these

protective factors and the ready availability of modern antibiotics. Thus thyroid abscess and AST represent only 0.1 to 0.7% of surgically treated thyroid pathologies.^{3,4}

Acute suppurative thyroiditis is a rare disease usually occurring in 20 to 40 years age group and more so in females.⁵

AST specially affects patients with thyroid gland pathology such as Hashimoto's thyroiditis or thyroid cancer and in children is associated with local anatomic defects. ^{4,6} In particular the condition is associated with the persistence of a canal originating from the 3th or

4th bronchial pouch that may lead to recurrent thyroid abscess. ^{7,8} In most cases the infection spreads to thyroid gland via piriform sinus fistula. ⁹

Diagnosis is based on clinical, laboratory, and imaging findings. The abscess typically occurs on the left side, and it is important to differentiate acute thyroiditis from the more common subacute thyroiditis. ¹⁰

When they occur, however, they may lead to significant morbidity including a thyroid storm, airway obstruction, internal jugular vein thrombosis and generalized sepsis.¹¹⁻¹⁴ If AST is left untreated it can be life threatening, resulting in 12% or higher mortality.¹⁰

In the current medical environment, failure of a thyroid abscess to respond to antibiotic treatment often requires open surgical drainage. The morbidity associated with open surgical drainage has led to the consideration of conservative management via needle (18–20 gauge) aspiration or catheter drainage under CT or sonographic guidance. ¹⁵⁻¹⁷

We studied 5 cases of successful nonsurgical management of a thyroid abscess with percutaneous 18 gauge needle aspiration. In all cases, the procedure was performed under sonographic guidance 7.5 MHz mechanical sector transducer.

METHODS

From January 2013 to December 2016, five cases of thyroid abscess which was diagnosed in the department of otolaryngology at Adichunchanagiri hospital which is a tertiary referral centre in rural area are included in the study.

Diagnosis was made according to clinical history, thorough physical examination, laboratory studies, and ultrasonography. The ultrasound examinations were performed with use of 7.5 MHZ linear probes with colour capability.

After the diagnosis of thyroid abscess is made, percutaneous therapeutic closed drainage under

ultrasound guidance was performed in all the cases as a primary treatment modality. The site of needle puncture was cleaned with iodine-alcohol solution and the ultrasound probe was covered with a sterile cover. All patients underwent ultrasound-guided aspiration first with an 18 gauge needle connected to a 20 mL syringe. Pus cultures from thyroid needle aspiration samples and blood cultures were grown to identify infectious pathogens. Isolated pathogens were tested for drug susceptibility. All the five patients were treated with intra venous broad spectrum antibiotics after the procedure and antibiotics were changed accordingly after culture and sensitivity reports were obtained.

A second ultrasound examination of the abscess was carried out on alternate days. A repeat attempt of aspiration was performed in cases were collection of pus was identified on repeat ultrasound examination. After discharge, all patients followed a regular follow-up protocol for at least 6 months.

RESULTS

During the 4 year period, 5 patients were included in this study, among them 4 were male and 1 was a female with ages ranging from 32 to 45 years.

The locations of these abscesses included 4 in left lobe and one patient with abscess in the right lobe of thyroid. There was positive history of upper respiratory tract infection in 2 out of 5 patients.

Blood investigations in all acute thyroid abscess patients showed increase in WBC counts with marked neutrophilia. ESR was raised in all cases with increase in C-reactive protein. Thyroid hormone assay were within normal limits.

After the aspiration of pus under ultrasound guidance, all patients were cured of their disease completely and no complications occurred. Aspiration of pus repeated in 3 out of 5 patients in follow up ultrasound which was performed after 3 days. There were no complications during and immediately after the procedure.

Table 1: Showing clinical characteristics of patients with acute thyroid abscess.

No.	Age/sex	H/o URTI	Side	WBC/ESR	Repeat aspiration	Pyriform sinus fistula	Hospital stay
1	34 y/F	-/-	Left	+/+	-/-	-/-	6days
2	38 y/M	Present	Left	+/+	-/-	-/-	7days
3	45 y/M	-/-	Left	++/+	Performed	Present	16days
4	35 y/M	-/-	Right	++/+	Performed	/	9days
5	32 y/M	Present	Left	+/+	Performed	Present	5days

Positive culture results were obtained in 3 patients. The cultures isolated from the aspirated pus included mainly

Streptococcus viridans, Klebsiella pneumonia, Fusobacterium and common mixed aerobes.

The hospital stay ranged from 5 to 16 days (average, 8.6 days). The hospital stay was increased in those patients in whom repeat aspiration was performed after follow up scan done.

Barium esophagogram and CT scan revealed presence of pyriform fistula in 2 cases and the fistula was treated to prevent recurrence at a later date After discharge from our hospital, no patient showed any symptoms or signs of recurrence at regular follow-up.

DISCUSSION

Thyroid abscess is a rare infectious disease because thyroid gland is well known to resist infections. The protective mechanisms include: rich blood supply and lymphatic drainage, high glandular content of iodine which can be bactericidal, separation of the gland from other structures of neck by facial planes and generation of hydrogen peroxide inside the gland as a requirement for the synthesis of thyroid hormone. Usually, patients with thyroid abscess have predisposing factors including congenital defect such as PSF or thyroglossal duct cyst, pre-existing thyroid disease and compromised immune system.

A wide variety of microbial pathogens such as *Staphylococcus*, *Streptococcus*, *Hemophilus influenza*, *Klebsiella*, *Escherichia coli*, *Pseudomonas*, *Enterobacter*, *Salmonella* and *Anaerobes* which are commonly found as normal flora in the oral cavity, have been reported as causes for AST. Rarely, *Mycobacteria*, *Aspergillus*, *Coccidioidesimmitis*, *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Candida*, *Treponema pallidum*, and *Echinococcus* have been identified. ¹⁸⁻²⁰

Clinical features of AST include fever, cough, hoarseness, dysphagia, sore throat, anterior neck swelling and limitation of cervical extension. Both thyroid gland lobes can be affected but the left lobe is more frequently involved. Leukocytosis and increased ESR and CRP are common. Normal thyroid function tests are typical, although transient or permanent hypothyroidism can occur in about 2%–3% of patients and thyrotoxicosis may occur in 5% as a result of the disease or treatment.

Ultrasound commonly shows heterogeneous echogenicity of the thyroid gland with irregular margin and inflammatory changes. CT scan is a useful modality for detecting loss of the normal high density of the thyroid gland, abscess formation and air density of a sinus or fistula.²¹

Although in some cases thyroid abscess can be treated with broad spectrum parenteral antibiotics alone, the most frequently recommended management is surgery, consisting of either excision or incision and drainage, combined with culture and appropriate antibiotic therapy.

Traditionally, the thyroid abscess surgical management involves incision and drainage. But this is associated with need for general anaesthesia, prolonged healing time, regular dressing, and possible unsatisfactory cosmetic outcome.²²

However, a more conservative, less invasive approach may result in decreased morbidity. Needle aspiration with sonographic guidance has proved successful in a few reported cases. ²³⁻²⁵

There is only limited literature available regarding ultrasound guided aspiration of thyroid abscess The best available evidence in the literature are related Deep Neck Abscess as whole and not specific to thyroid abscess and it suggests USG guided drainage in select cases of neck abscesses is an effective alternative to I&D. One of the first series to demonstrated ultrasound guided aspiration of deep neck abscess is in 1985; Herzon reported the effectiveness of 18-gauge needle aspiration for the treatment of neck abscess. Of 25 patients, 80% were successfully cured, but 20% subsequently required open surgical drainage. ¹⁵

Subsequent reports by Yeow et al, demonstrated successful drainage of deep neck abscess involving parotid and retropharyngeal spaces. ^{26,27} This group then reported their experience with a series of 15 unilocular deep neck abscessess with a success rate of 87% when using USD, with no complications. ²⁵

The first study which is specific to USG guided aspiration of thyroid abscess is by Ilyin et al. They reported two cases in which drainage of the thyroid abscess was performed twice (on the first and fifth day of admission) using a 21-gauge needle, followed by injection of antibiotics into the abscess cavity. There were no immediate or delayed complications. In both cases, the patients were completely cured with no recurrence during follow-up periods of 6 months and 5 years, respectively. Other authors report successful aspiration of thyroid abscesses following a single aspiration. ^{24,25}

Our study involves 5 cases which is significant number in thyroid abscess ultrasound guided closed drainage case series. We used 18 gauze needles with 20 ml syringe to evacuate the pus under USG guidance. USG scan repeated after 3 days and procedure was repeated only in 3 out of 5 patients. All the cases were cured of abscess without any complications in our series.

In our study, no cases required an open surgical drainage after USG guided aspiration. The advantage of our technique involves minimal healing time, less hospital stay with no cosmetic problem. The procedure can be easily done without the need of general anaesthesia and major operation theatre.

Thus, USG guided percutaneous closed drainage of thyroid abscess with an 18 gauge needle appears to be an effective alternative to open or catheter drainage because of better outcomes.

But, whenever there is an evidence of airway compromise, the airway should be secured first, followed by surgical incision and drainage in the operating room.

USG guided aspiration of abscess is not recommended in those circumstances and incision and drainage should be considered as a first line treatment modality in airway compromised situations.

Further larger studies are required to confirm the effectiveness of this technique and to better define its indications and contraindications.

CONCLUSION

Because of good clinical outcome, patient acceptance, shortened hospital stay, safe and effective procedure, the USG guided percutaneous closed drainage of thyroid abscess is an excellent alternative to open incision and drainage in a thyroid abscess without any airway compromise.

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Institutional Ethics Committee

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